

ATLAS
OF
DISEASES OF THE MEMBRANA TYMPANI

H. MACNAUGHTON JONES

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A T L A S

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DISEASES OF THE MEMBRANA TYMPANI

BY

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P R E F A C E.

A FEW years since I commenced selecting the cases, both hospital and private, from which the Drawings in this Atlas were made. I then had the singular advantage of having associated with me in the Cork Ophthalmic and Aural Hospital one whose patience and assiduity were only equalled by her love of these special branches, and her peculiar aptitude both for the Aural and Ophthalmoscopic work to which she then devoted herself.

For the labour, care, and patience which she bestowed on these drawings I cannot too heartily thank the artist, Miss M. Boole, to whose devotion to the study of the diseased conditions portrayed, and selected from a large number of aural patients, I am indebted for these most truthful representations. All those chosen for this Atlas were completed under my constant supervision, and in no instance was a drawing of a membrane regarded as perfect until we were both fully satisfied of its being an unexaggerated as well as truthful representation of the diseased or abnormal condition. Thus at least I am enabled to vouch for the strict accuracy of these drawings. Faithful representations have never been sacrificed for artistic effect. I was much afraid that a great difficulty would arise in the attempt (for the first time in this country) to lithograph the drawings, but Messrs Hanhart, who have for the publishers completed this part of the work, have exceeded, in the execution of the plates, my utmost expectations; and owing to their kindness in repeatedly revising any figures not deemed perfectly satisfactory, they have produced copies, not to be dis-

tinguished from the originals. Dr Ringrose Atkins, Resident Medical Superintendent of the Waterford Lunatic Asylum, has furnished me with the drawings of the othæmatoma and the letterpress description of this affection.

I have chosen for delineation only such cases as might furnish truthful representations of morbid states occurring continually, and which may at any time come under the notice of the practitioner. I intend the Atlas as an accompaniment to the Aural Treatise, and as an aid to the practitioner in diagnosing affections of the ear. The work has no pretension to be a complete one. But in the drawings of the membrane, the particular ones selected do cover a large field in otological work. The cost and labour in bringing out even this collection, has been very great, and I have to thank the eminent Publishers, who gave me every assistance and afforded me every facility in the undertaking. The letterpress description of the diseases which are illustrated in the plates I have taken, with some slight alterations, and necessarily condensed, from my treatise on "Aural Surgery." I have only, in conclusion, to express a hope that the Atlas may prove of some use to those who take an interest in the diagnosis and treatment of aural affections.

H. MACNAUGHTON JONES.

ST PATRICK'S PLACE, CORK,
September 1, 1878.

THE NORMAL MEMBRANA TYMPANI.

FIG. 6.

The healthy membrana tympani varies in colour from a "pearl" or "neutral gray" to a yellowish white, or at times even an ivory white; it is translucent and concave. It is placed obliquely, and forms with the floor of the meatus a very acute angle, and with the roof a slightly rounded obtuse angle of about 140° . It is fixed to the temporal bone at its circumference, and by its centre to the handle of the malleus, which is seen on external examination as a reddish yellow streak. At the point where the manubrium terminates we notice the most concave portion of the membrane, and here we see the well-known triangular spot or pyramid which gives to the membrane that beautiful and lustrous appearance when light is thrown on it by the mirror. The bright spot has its base generally directed downwards, but its position and extent are variable, and it is by no means uncommon to find its usual shape altogether lost, or perhaps no bright spot in an ear in which the hearing power is perfectly normal. It serves as a delicate indication of the degree of mobility of the membrane, as it is variously altered when the membrane is forcibly inflated. In a normal state this spot partially disappears on inflation, and the funnel-shaped depression underneath it is bulged outwards. The short process of the malleus is also of considerable importance in a diagnostic point of view, for it separates, as described by Tröltsch, the inferior from the posterior pocket of the membrane, the posterior being over, the anterior under the short process. These pockets are formed by the ligamentous folds of mucous membrane, or prolongations of the ligamentum mallei anterius. They are of clinical importance, as it is now recognised that here the secretion of mucus is retained (Hinton), and that they are the source of the bulgings of the membrane which we so frequently see when this retention occurs. We should in examination seek to satisfy ourselves on the following points—(a) the appearance and position of the handle of the malleus, if drawn inwards and "shortened in perspective" (Tröltsch); if it appears unusually prominent, or altogether displaced and dislocated from its natural position; if it is vascular on the surface, and presents a

red appearance ; (b) the triangular spot, if present, its direction and lustre ; if the cone has lost its distinctive shape, or if there are two or more of these distinctive spots of light ; (c) the general colour and appearance of the membrane itself ; its degree of curvature, opacity, and thickening ; the degree of mobility on inflation ; the signs of any deposits, calcareous or otherwise ; the presence of polypus ; if there be pulsation, rupture, or perforation.

EXOSTOSIS IN THE MEATUS.

FIGS. 1, 2, 3.

These tumours frequently occur without any assignable cause. They may be congenital. I have frequently seen them connected with a gouty history and family. As to treatment, I believe in preserving the patency of the chink, careful syringing, and the topical application of agents calculated to reduce the congestion of the membrane lining the canal. Electrolysis has been tried with success (Clark). A drill, similar to that used by dentists, has been employed to bore through the exostosis, and sea tangle subsequently employed to dilate the passage. In the "British Medical Journal," Dec. 22, 1877, Mr Lennox Browne has reported a successful case of exostosis treated by the dentist's drill, and subsequent avulsion of the exostosis. Mr Field of St Mary's Hospital has just published the particulars ("Lancet," July 20, 1878) of a most successful case of ivory exostosis treated by the drill. See also case reported at the Otological Congress, 1876, by Dr Matthewson of Brooklyn. Mr J. P. Cassells has furnished some valuable additions to our knowledge of the etiology of these growths. Of the agents I have found most useful in exostosis, I may mention especially, nitrate of silver, chromic acid, and chloride of zinc, syringing with alkaline solutions, injections of iodide of potassium, or hydrochlorate of ammonia.

The aural probe is most useful for cleansing the chink and applying solutions. A camel's-hair pencil, cut so as to leave only a few of the central hairs, answers admirably for the patient to use himself. Whatever means be adopted, the great secret is to ensure perfect cleanliness, and to prevent,

if possible, complete closing of the canal. I have given largely to patients affected with exostosis, iodide of potassium, but I cannot speak very favourably of the results. In the case from which the drawings 1 and 2 were taken, the gentleman, a medical man, has been restored to comparative comfort and good hearing power by attention to the treatment here laid down.

PERFORATION OF THE MEMBRANA TYMPANI.

FIGS. 9 TO 24.

The patient, having suffered from some form of aural catarrh, simple, acute, or chronic, comes complaining of deafness and discharge; there may or may not have been attendant pain. When we inquire into the cause, especially in children, we find that it is not easily ascertained. It may be attributed to cold, or some feverish attack, or have supervened on some one of the exanthemata. Its origin may have been a foreign body or an injury. On examining the ear there is often a quantity of yellowish discharge (fig. 53) concealing the membrane and perforation; this is chiefly pus mixed with epithelium. On washing this well out, we see the membrane in varying degrees of thickness and shades of colour, most frequently perforated. These perforations are often large, and not uncommonly a polypus is detected growing from the tympanum through the perforation, or projecting from it (figs. 42 and 45).

The aperture may vary in size from a small pin-hole (figs. 17 and 18) or chink to a large ragged opening (fig 11).

One or all the bones may be destroyed, ankylosed, or attached by adhesions to the tympanic walls. A mere rim of membrane may be all that is left, or even this may be absent (figs. 9, 10, 11, 12, and 13).

A perforation, unless it presents the form of a mere rent in the membrane (fig. 50), or a minute pin-hole (figs. 17 and 18), is easily seen, and if not seen, is discovered by means of the otoscope. A source of error to beginners is the bright bubble of air and liquid which sometimes obscures the orifice. On throwing a good light on the membrane, and desiring the patient to close the nose and blow, the air will be seen to bubble out through the aperture in the membrane. Sometimes these perforations pulsate; this

is due to the arterial throb. This pulsation may alarm one not accustomed to examine acute perforations (fig. 36) ; it is valuable as a diagnostic sign.

A large number of patients who have extensive perforations yet retain remarkably good hearing power. The greater the number of cases we treat, the more are we astonished at the percentage of patients whose hearing varies, say from $\frac{3}{50}$ to $\frac{10}{50}$, with the watch test, and whose conversational power is excellent. As noticed by Politzer, Wilde, and others, this hearing power does not appear to depend so much on the size of the perforation as the part implicated. It, of course, is more particularly influenced by any abnormality of the stapes itself, directly through adhesions, ankylosis, &c., or indirectly through the direction of the perforation (Poltitzer), and the transmission of the sound waves to this bone. This is to be remembered in the application of artificial membranes, the good effect being not so much attributable to closure of the opening by the disc or wool, as to properly applied pressure on the stapes. Hence it may be only after two or three trials that we get the desired result, in applying a membrane for the first time. The second point I wish briefly to notice is—the large number of children who apply for relief for perforation of the membrane. Aural catarrh, acute or chronic, is often shamefully neglected in children; the younger the child, and therefore the less competent to make its complaint known, the greater the probability of neglect. Aural mischief is, in a very young child, often masked by symptoms which direct attention to other parts, the brain, stomach, or the teeth. Discharge from the ear is long neglected, and the ignorance of its cause, or the results of its continuance, induce many to fancy that to arrest it is a mistake. Therefore it is that in children, where there are obscure head symptoms, with feverishness and restlessness, the surgeon should always examine the ear. Discharge continues often for a long time in children with but little effect on the hearing and no pain. When the ear is seen for the first time there is frequently perforation of the membrane, a granular state of it, or polypus (as in fig. 46, drawn at first visit).

The neglect of aural complaints in young children is a fact that cannot be too strongly animadverted on. Too frequently it happens that the surgeon is asked for advice only when irremediable and fatal brain complications have arisen. If this be on the part of friends culpable, how much more so in the case of the medical adviser, who, through carelessness, has permitted these warnings to pass unheeded, which might, if noticed in time,

save life. In treating a case of perforation we must not merely direct our efforts towards healing the membrane, but we must also attend to all the passages, as, for example, any relaxed or congested state of the mucous membrane of the pharynx, enlarged tonsils, and to the naso-pharyngeal mucous membrane. If the throat be engaged, astringent washes, lozenges of kino, guaiacum, chlorate of potash, catechu, plain or effervescing (Throat Hospital Pharmacopœia) douches, or sprays, with carbolic acid, or permanganate of potash solutions, &c., are useful. Touching the pharynx and Eustachian tube with solutions of nitrate of silver, chloride of zinc, or perchloride of iron, insufflation of finely powdered guaiacum through the nares, or on the pharynx, these are a few out of the many means which may be resorted to. If the tonsils are much hypertrophied, they should be removed with the tonsil guillotine.

Often as I have removed the tonsils, I have never had any troublesome bleeding with this instrument,—none which a little alum gargling or the use of perchloride of iron did not immediately restrain. The suction of ice before and after removal is a precaution I always adopt. If the Eustachian tube is closed or obstructed, it must be attended to, catheterised, and washed out with warm alkaline solutions. So also the tympanum; if there be any accumulated secretions, Politzer's air douche is here indispensable. But when we come to deal with the perforation itself, the first essential is perfect cleanliness, by washing out all the discharge from the tympanum and meatus. This is best done after cleansing the meatus by passing a stream through the tympanum—the head being bent forward, and thus allowing the fluid to run through the nose. In this manner the entire passages are cleansed. I select generally a chloride of zinc solution (gr. ij. to gr. iv. to the ounce), with a little glycerine or carbolic acid. I always first pass a stream of water through, and then the astringent or disinfectant solution. In fact, in all syringing of the ear, warm water should first be used, so as to clear out any old discharge before employing a medicated solution. The healing of the perforation, which is generally a tedious process, is best effected by repeated topical applications of various stimulating and astringent solutions.

Talc powder, tannic acid, nitrate of silver, chloride of zinc, sulphate of zinc, alcohol, and glycerine are some of those most frequently used with success. Having cleansed out the meatus and perforation well, the latter should be then thoroughly dried with cotton wool rolled on the aural probe,

and then with this same probe, the nitrate of silver or other solution carried well down to the perforation, and its margin touched.

If the talc powder be used, it must be very gently blown with a fine tube, and quite on to the surface of the membrane, and care must be taken that it is washed out every third day before it is again applied. I rely chiefly in all these cases on nitrate of silver (10 to 20 gr. to the ounce). I find it, after various trials, the most efficacious remedy for healing perforations. Alcohol and glycerine, equal parts of each, I find also most useful for cleansing and hardening the membrane. I know no better lotion for the patient's own use than that of sulphate of zinc and glycerine with carbolic acid. However, these remedies and others must be alternated and varied in the treatment of perforation, the secret of treating them successfully being constant attention and cleanliness on the part of the patient, combined with the application, almost daily, by the surgeon himself, of the more powerful remedies. In the acute stages preceding the perforation, every means should be adopted to arrest the force of the inflammation and to relieve pain, such as leeches, warm fomentations (never poultices), gentle warm washings out of the meatus, attention to the throat, and I am old fashioned enough to recommend in many cases vesication over the mastoid. When discharge does accumulate, it should be gently and carefully removed. If paracentesis is indicated, the operation should be performed without delay. With reference to the application of artificial membranes, I seldom, lately, resort to the membrane; I frequently use the plain "egg" of cotton wool. In some instances there is marked improvement, but I must say that in my experience, in a large percentage of perforation cases, that improvement is not sufficient to compensate for the inconvenience and slight risk which attends the use of the artificial membrane. This is particularly so in the poorer classes of society, where neglect of the artificial membrane is often found to be followed by bad results. I prefer in such patients to get the membrane and perforation into as healthy a state as possible, enforcing on them a periodical visit; and unless they are very intelligent I do not trust them with an artificial membrane. This I give as my experience and practice; but every one can try the artificial membrane for himself, adopting such precautions as I have already elsewhere drawn attention to. The feelings of the patient, and the success of the experiment are the best tests which he can have of its utility in any individual case.

INFLAMMATION OF THE MEMBRANA TYMPANI.

FIGS. 7, 8, 36, 37, 54.

In these cases the pain is often most intense, and increases with alarming rapidity, the inflammation running on in a few days to ulceration, when perforation of the membrane results. Inflammation of the membrane is, as a rule, accompanied with a certain degree of inflammation of the meatus, the entire ear becomes exquisitely sensitive, and the pain extends to the corresponding side of the head and face. Relief is sometimes experienced when the perforation occurs. The throat is constantly affected, and consequently the Eustachian tube. The treatment is simple. In the early stages free depletion by leeches (the artificial leech, if it can be had), warm fomentations, vesication over the mastoid; constant warm douchings applied through the meatus; attention to the throat, both by means of the syphon douche and also by topical applications by means of a brush; and in certain cases, where the membrane is seen bulging and secretions are accumulated on the tympanum, free incision of the membrane. This last mode of treatment is unquestionably indicated in those instances of inflammation which occur in scarlatina and during the exanthemata. It is now widely recognised as the proper step to take when the ear is threatened in these affections. Subsequently to the subsidence of the acute symptoms, close attention must be directed to the condition of the Eustachian tube and the cavity of the tympanum, thorough cleansing of the meatus and membrane, the use of Politzer's bag, and, if necessary, the washing out of the tympanic cavity with warm alkaline solutions (muriate of ammonia or iodide of potassium), two grains to five grains to the ounce. At the same time the general health must be restored by change of air, tonics, cod-liver oil, and iron with quinine.

ABSCESS IN THE MEATUS.

FIGS. 5, 55.

Furuncles and abscesses in the external meatus, occurring either as the result of exposure to cold, damp, or the presence of a foreign body, accumulation of wax, &c., are very common. They occur in persons of all types of constitution, often in the midst of robust health, and at all ages. The symptoms are characteristic—severe pain of a shooting nature, increased at night, with some slight attendant fever and constitutional disturbance. This pain is of a radiating character, extending to the side of the head, and aggravated often by movement of the jaw, as in eating. The entire ear becomes sensitive to the touch, the patient shrinks from examination. The abscess may occupy any portion of the canal, and vary in size from a minute boil, situated on some part of its wall, to a considerable swelling, which may block up the entire meatus. The intensity of the pain and the symptoms vary according to the situation and extent of the inflammation; whether it be restrained by the bony boundary of the canal, and in proximity to the membrane, or seated more externally in the cartilaginous portion. The advent of the attack is frequently marked by a certain amount of tinnitus. The presence of the abscess is easily recognised. It is not often necessary to use any speculum, and this should be avoided if possible, as its employment causes unnecessary pain. The meatus may be entirely closed by the swelling (fig. 56). This gives rise to a possible source of error, yet one which, with any degree of care, should never be committed. Quite recently I found it difficult to persuade a medical man of some experience that such a case was not one of polypus.

I have known an instance where an attempt was made to snare an abscess in mistake for a polypus. It is needless to say that, with a little care, and if any doubt exists, an examination with a probe, such a mistake could not result; the complete continuity of the abscess with the wall of the meatus immediately distinguishes it. It is rare for the inflammation to resolve itself, and generally in periods varying from two to six or eight days pus forms and is discharged. The treatment consists in depletion

with leeches (two to four) applied over the tragus or in the meatus; in the early stage of the disease warm fomentations, decoctions of chamomile and poppies answer well, and steaming the ear. Hinton and Roosa caution against the use of external poultices, the latter recommending a small conical linseed poultice introduced into the ear. I rely on constant fomentations (Maw's aural douche will be found most convenient) with poppy water, and sometimes benefit may be had from a blister applied over the mastoid process in the early stages. I have often found vesication of great use in allaying the pain. I have applied also with benefit subcutaneous injections of morphia. If the meatus be not blocked up, warm injections of carefully-strained poppy water, frequently repeated, will be found grateful. When the abscess has formed, the early evacuation of pus, by an incision carried well into it, is the only treatment, this incision being followed by careful attention to the meatus and membrane. On this latter point it is not possible to speak too strongly. Many are satisfied with the relief they give their patient with the first incision, and do not continue their care of the canal for some days subsequently. The result is frequently occlusion of the passage, with epithelium and discharge, perhaps recurrent abscess or implication finally of the membrane. I keep the passage well cleaned, using some mild astringent lotion, such as sulphate of zinc or borate of soda with glycerine, and warm injections for several days. As abscesses are particularly likely to recur, it is well to warn the patient of this tendency, and so avoid the unpleasantness which sometimes arises from impatience at the prolonged nature of the affection. At times abscess in the meatus assumes very formidable proportions; this is particularly so in those cases where there is frequent recurrence of the abscess. Some time since I had under my care a patient who came with the meatus completely closed with abscesses; on the opening and re-opening of these and the subsidence of the inflammation, an enormous quantity of serum and epithelium came away, the membrane being perforated behind the mass.

Fig. 5 represents the meatus of a gentleman who suffered for several months with abscess of the meatus; inflammation extended to the mastoid cells and tympanum, periodical attacks of violent pain, redness and swelling of the mastoid and the parts above the auricle supervened, and then a copious discharge of pus took place from the meatus. Occasionally these

attacks were attended with alarming constitutional symptoms—violent headache, coated tongue, exaltation of temperature, rapid pulse, and sleeplessness ; on the escape of the pus all these symptoms subsided.

VASCULAR POLYPI.

FIGS. 40, 42, 44, 45, 46.

I group under this heading those small vascular growths which are so characteristic of a type of polypus which springs from the tympanum or the membrane. There is, as a rule, perforation, though it is frequently concealed by the polypus. For operating on these growths, I use either the rectangular ring forceps, or the lever ring forceps of Toynbee. The latter instrument is admirably adapted for this purpose. But removal of these troublesome growths is only the first step in the process of cure ; it requires often considerable forbearance, on the part both of the patient and surgeon, to follow up the treatment. Daily touching of the exposed surface with some caustic is required, as well as thorough cleansing out of the canal. Having wiped the raw surface with cotton wool, used with the aural probe, then the site of the polypus must be touched with a fine pencil of wool rolled on the point of the probe, and moistened with chloro-acetic acid. I also use nitrate of silver, carbolic acid, chromic acid, and alcohol with glycerine ; but, after a fair trial of many agents, I prefer the chloro-acetic acid to any for this purpose. One rule should be adopted in every case : no one should be satisfied as to the cure of the disease until all discharge has ceased, any superfluous cakes of epithelium are removed, and the surface from which the polypus springs presents a healthy appearance. Figs. 41 and 47 represent membranes from which vascular polypi were removed, drawn when the scar was healing. On removal of the polypus a perforation frequently remains, as seen in figs. 20, 43.

THE FIBRO-GELATINOUS POLYPUS.

FIGS. 38, 39, 56.

Fig. 38 shows well a polypus of this nature growing from the roof of the meatus, concealing a perforation. As in this case, the polypus is frequently concealed by epithelium or purulent discharge. This latter being removed, the polypus is readily seen. The characteristic symptoms are deafness, with catarrhal discharge occasionally mingled with blood. The best instruments for their removal, which is a simple operation, are Wilde's snare, a small polypus forceps or miniature vulsellum. (See Dalby on "Aural Diseases" for an histological account of these polypi.) A good example of the fibroid polypus is shown in fig. 56.

SEBACEOUS TUMOUR IN CAVITY OF TYMPANUM.

FIGS. 23 and 24.

A boy with complete perforation of the membrane in both ears applied for relief at the hospital. He had been previously subjected to treatment, and was under my care some years since, when he was threatened with brain mischief, with severe otorrhœa. On syringing the left ear, I perceived in the cavity of the tympanum, which was quite exposed, and growing from its roof anteriorly, a small tumour, quite white, on the surface of which I could distinctly trace vessels (fig. 23). I had never before seen a case of this nature, and at once suspected a cystic tumour growing in the tympanum. I made with a fine lance-headed knife an exploratory incision, and found that it entered easily into the mass. I now passed in a Toynbee's forceps and squeezed out the sebaceous contents, part of which came away with the forceps on withdrawing the latter. In order to ascertain the nature of the growth, I now again introduced the forceps, and closing the rings on the sac, completely removed it from the cavity of the tympanum. Fig. 24 shows the tympanum, as drawn on the day after the removal of the growth.

MEMBRANE AFTER REMOVAL OF CERUMEN.

FIG. 29.

On the removal of cerumen, the membrane is generally seen, dull, with an absence of transparency, and the surface of the malleus has an inflamed appearance. The collection being removed by syringing, an interval of a few days will generally set things to rights, and if this be the sole cause of the symptoms, nothing further is necessary. If any tinnitus or pain persists, or if the deafness be not relieved, we must suspect other mischief, and proceed to examine the ear closely. The usual complaint made by patients suffering from "wax in the ear" is a deafness, with a stupid feel, and some form of tinnitus. I generally insufflate the tympanum after removal of wax. The most ridiculous errors are often committed from the non-recognition of this simple cause of deafness. The characteristic black shining surface of the wax can hardly be mistaken with any degree of care. At times the surface has a peculiar lustre, which causes it to look like the membrane; but it is only necessary to mention this, in order to prevent any surgeon falling into so unfortunate an error. The impaction of wax on the drum is frequently caused by such imprudent practices as the insertion of rolls of paper, the corners of towels, &c., into the meatus for cleansing purposes, and is often complicated by the wearing of cotton wool in the ear.

EUSTACHIAN OBSTRUCTION AND CLOSURE.

FIGS. 26, 27, 28, 31, 35.

The original causes of Eustachian closure may be simply cold "caught" in any way; exposure to draughts, damp, rheumatism, sea-bathing, exanthemata, heavy mental shocks, &c., are some of the most frequently assigned causes. During a cold, every one is familiar with the sense of stuffing in the ears, and perhaps muffling of sounds, or tinnitus, which accompanies it. On examining the throat we may find the mucous membrane swollen or turgid; perhaps the uvula is enlarged, or the

tonsils are hypertrophied. The faucial orifice of the Eustachian tube is likewise swollen, and in consequence, there is temporary closure of the passage, and mucus is imprisoned in it. It is when this condition persists for a little time that we see the characteristic membrane of Eustachian closure (Figs. 26, 35). Hinton says that this form of membrane is characteristic of Eustachian deafness. "The malleus appears foreshortened, and the membrane has a tense stretched look, like a drawn curtain, often falling into similar folds. The colour varies, is generally white and dull; but sometimes, especially in the earlier stages, the congested mucous membrane of the tympanum shines through it" (fig. 27). When inflation is resorted to, with the otoscope we may hear no sound or with great difficulty detect the entrance of the air. Now, this simple swelling of the Eustachian tube, which at first may be periodical and remittent, may finally become chronic and permanent, beginning with a slight deafness, and perhaps a little ear-ache; it may or may not be a considerable time, dependent to a certain extent whether the mischief appertains to one or both ears, before troublesome deafness, accompanied with tinnitus, occurs. Nothing is more astonishing than the extent to which persons permit aural mischief to proceed before they seek relief. This is the more remarkable if only one ear be affected; often it is the incessant noise in the ears which forces them to apply, and not the deafness. If the closure and obstruction lead to other results, say acute inflammation (catarrh) of the tympanum and perforation of the membrane, as it frequently does, then they apply for relief of the pain and other symptoms which accompany it. If it does pass into this chronically contracted or permanently closed state, the most serious results will follow.

The slight catarrhal inflammation, which is the consequence of the primary affection, leads to an accumulation of mucus. This mucus increases in quantity and is imprisoned. It may become hardened, and form hard masses both in the tube and the cavity of the tympanum, about the chains of ossicles, and on the membrane. A collapsed and closed Eustachian tube, leading to imprisonment of mucus, abnormal concavity of the membrana tympani, followed later on by alteration in the shape and appearance of the latter, adhesions, ankylosis of the ossicles, and hardening of the mucus, are the usual effects which ensue on a common cause, viz., a catarrhal state of the naso-pharyngeal mucous tract.

In the treatment of all conditions supervening on a closed or obstinate state of the Eustachian tube, the first object is to secure its patency, by the passage of the catheter, assisted, if necessary, by ordinary or laminaria bougies (very fine), about half a line in diameter for the narrowest part of Eustachian (Hinton). If a laminaria bougie is used in addition to the catheter, it must not be left in longer than twenty minutes. The bougie is passed through the catheter, which is put in first, and the catheter is withdrawn before the bougie. I seldom now use any bougies. Various sizes of the latter may be introduced through the catheter, which then can be withdrawn with the bougie, and so we may prevent its being broken in the passage. I have never had a case of a foreign body (except snuff) blocking up the tube. I rely in most cases of Eustachian closure mainly on warm iodide of potassium injection and frequent use of Politzer's bag. The nasal douche of salt and water is often of great benefit. But constantly we meet patients who cannot use the syphon douche; then the simple sniffing up of a warm solution of salt is a capital substitute—about an egg-spoonful to two wine glasses of tepid water, used once daily. If acute perforation occurs from closure of the Eustachian tube, we must be satisfied with gentle washing out of the tympanum with a warm solution of chloride of ammonium, while we attend to the inflammatory condition of the membrane by warm fomentation, gentle syringing with anodyne and alkaline washes, leeches, or vesication.

COLLAPSE AND RIGIDITY OF THE MEMBRANE.

FIGS 28, 31.

These drawings represent a condition of the membrane following on closed Eustachian tube. Hinton describes this state under the above heading. Fig. 28 I selected as a typical example of the thin membrane of extreme collapse, which in this case had a pinkish semi-transparent look, the membrane was blown out like a bladder on inflation. Fig. 31 shows the characteristic white membrane of collapse. The upper portion of the membrane and the malleus were fixed from old adhesion; the lower part was blown out like a bladder on inflation (see figure), as in the last case.

Hinton notices the fact illustrated in the above-mentioned cases that the hearing power was often good. He advises, when the membrane lies in contact with the tympanic wall, the application of the artificial membrane. Suction of the meatus, as recommended by him, I have frequently found of service in these collapsed conditions of the membrane. This is best effected with the pneumatic speculum, through which we can at the same time see the adhesion and the extent to which the membrane and malleus are adhered. But it is a good plan to give a patient a piece of tubing with a quill inserted in one end to fit the meatus, and instruct him to apply suction with the mouth through the other. This plan of suction and inflation practised by the patient himself may be followed up by incision of the membrane, or in rare instances (Hinton) an attempt may be made to restore the malleus to a normal position, as by doing so we free the stapes. This, however, is a step not to be lightly undertaken, as it requires the most delicate manipulation to cut round the adherent malleus or stapes, and raise them by the gentlest of pressure into a better position. Politzer's plan of "air tight closure" of the malleus when the membrane has been well inflated, may be found useful in these cases of collapsed membrane. A piece of cotton wool is rolled into a ball with some cord or softened wax, and after a powerful inflation of the membrane, the meatus is plugged with the ball. This the patient can do himself, wearing the ball at night, and periodically omitting it.

CATARRH OF THE TYMPANUM, WITH BRAIN COMPLICATIONS.

FIG. 54.

The subject of this drawing, a little girl, was attending the hospital with aural catarrh. She came with the meatus considerably contracted, and there was great difficulty in introducing the smallest speculum; however, after a few days, by careful cleansing and syringing, I was enabled to see the membrane. I determined, on seeing its bulging and inflamed look, to puncture, and expressed my anxiety as to the danger of some secretion being detained in the tympanum. The child was to have been operated on

on the following day, but the friends neglected to bring her. I afterwards learned that she died eomatose, with convulsions. This was just one of those cases where close attention to the ear and incision of the membrane might have saved life. In children especially this brain mischief is apt to creep on unperceived. The rapidity with which cerebral complications make their appearance, in the midst of perfect health, in cases of long standing ear disease, should always be borne in mind. Increase of pain and deafness, with constitutional symptoms, such as rigors, high temperature, furred tongue, rapid pulse—mark the onset of the mischief—and as perhaps the discharge from the ear has ceased, attention is diverted from this organ. But often, notwithstanding every effort, the patient rapidly succumbs. The pain increases in the ear, and radiates over the entire head. The pulse falls, the bowels are constipated; obstinate vomiting may ensue. The mind generally remains clear, but finally the patient sinks eomatose or convulsed. In treating such cases there must be no delay or tampering. Prompt and energetic action is required, thorough exploration of the meatus, removal of all discharge, and any polypus, if present, instantly removed, repeated fomentation, the application of leeches, free incision of the membrane, if we suspect pent up secretion, and the same over the mastoid process, or the use of the trephine if there be any bulging of the inflamed part, from which we may suspect the presence of purulent matter in the mastoid cells. On these occasions I have seen life saved by a free incision made down to the mastoid process, the incision being followed by the escape of pus and dead bone.

HEREDITARY SYPHILITIC DEAFNESS.

FIG. 52.

Numbers of cases of deafness are due to inherited syphilis. In many patients there is no abnormal appearance of the membrane which can be looked on as pathognomonic. In several others I have seen the membrane dull and thickened, it has lost its transparency, is rather of a grey

colour, and inflates with a dry click, as in the ease from which this membrane was drawn. I believe, however, that it is impossible to define any typical appearance in this affection, in which, I regret to say, that treatment has with me proved of little avail. If taken in the early stages, or when the symptoms first manifest themselves, much may be done by mercurial treatment (inunction), followed by iodide of potassium internally, at the same time that the Eustachian tube is attended to, and the tympanum kept free by warm iodide of potassium injections. But when a case comes, as in the subject of this fig., with extreme deafness (both with the watch and the tuning fork), and presents the characteristic teeth of Hutchinson, and the proofs of an attack of interstitial keratitis, either remote or recent, I do not hope for a good result from any treatment.

CRETACEOUS DEPOSITS ON THE MEMBRANE.

FIGS. 48, 49.

These deposits occur occasionally and are easily recognised. They appear as white layers of chalky substance on the membrane, which is generally also altered in shape, perhaps adherent to the tympanum.

They may exist without much disturbance of hearing, and frequently are to be found in one ear only. Fig. 48 represents the membrane of a lad of 18, whose hearing in the left ear was normal, and who consulted me for obstinate deafness in the right ear. The two pockets were covered with irregular-shaped white masses of a chalky substance. The tuning fork was heard less loud in this ear, and inflation of the membrane was attended with a dry sound. I did not interfere. Fig. 49 shows the membrane of an officer who consulted me for constant tinnitus in the right ear. The deafness had lasted ten years; it was rather worse of late; he had been twelve years in India; the tinnitus commenced after his return home, and the deafness grew worse. There never had been pain; there was no family history of deafness. The watch was not heard on contact. The membrane had a cretaceous mass in the superior pocket, and on inflation there was a dry and grating sound. The tuning fork was heard only in the left ear, whether

placed on the head or the teeth. He suffered from giddiness at times, and tendency to fall. When the secretions were irregular, or that he was "bilious," the tinnitus, he said, became much worse. Nothing relieved him. Hydrobromic acid and bromide of potassium cured the giddiness, but the tinnitus yielded to no treatment.

INVETERATE ECZEMA OF THE AURICLE.

FIGS. 57, 58.

By far the most troublesome variety of ulceration of the auricle is that which results from a chronic form of eczema, in which a thick and hard scab forms over a most inveterate and highly ichorous discharge.

This crust clings with great tenacity to the part, and is with difficulty removed. When it is removed, the fluid which lies concealed by the scab is nearly transparent and straw-coloured. The entire helix is involved, and the ulceration extends so deeply that there is a loss of substance, and perhaps permanent disfiguration of the lobe (fig. 58). It is particularly liable to recur.

The treatment I have pursued in these cases is much as follows:—Complete removal of the scab, and thorough cleansing of the raw surface, which is then touched with either chromic acid or carbolic acid lightly. This removal of the scab is repeated as often as it forms, and the acid is very gently re-applied. The patient may himself use a lotion of calomel and lime water after a few days, and smear a carbolised zinc and vascline ointment to the part at night. A few applications of the acid are generally sufficient, and then the chloride of zinc (*3i ad ʒi*), applied after the removal of the scab, acts admirably. The main secret is the removal of the crust and the thorough, often daily, topical application to the ulcerated surface beneath. The general health, at the same time, has to be attended to, and the internal use of arsenic and iodide of potassium may with benefit be prescribed. Often in these eczematous states and in psoriasis of the scalp, the meatus becomes full of cakes of loose epithelium, which block up the passage, impair the hearing, and produce in time alterations in the membrane. These should

be constantly and carefully removed by syringing and forceps ; the passage well cleaned out with cotton wool, and chloride of zinc with glycerine, or glycerine and rectified spirit, and nitrate of silver solution employed to keep the auricle healthy.

INFLAMMATION OF THE MASTOID CELLS.

FIG. 63.

In various catarrhal states of the meatus and tympanum, the inflammation may spread to the mastoid cells and to the brain. The cerebrum and cerebellum may be attacked, more frequently the latter, if the case be that of an adult. There are many causes which give rise to inflammation and abscess of the mastoid process. The exanthemata, injury, abscesses in the meatus, catarrh in the tympanum, polypi, scrofulous inflammation, all may, both in children and adults, lead to abscess in the mastoid or mastoid periostitis. The periostitis which accompanies these catarrhal states of the meatus, and which at times occurs independently of them, is marked by characteristic symptoms. There are frequently severe constitutional accompaniments, such as rigor, rapid coating of the tongue, quick pulse, increase of temperature with severe pain. The post-auricular and supra-auricular regions become red and swollen. The rapidity with which the swelling occurs is often alarming. In a case I had of severe furunculous inflammation in the meatus, the entire side of the face and neck became swollen in forty-eight hours. The swelling has then an erysipelatous look. I have never yet seen a case of mastoid periostitis or abscess where the meatus and tympanum have not been involved. The sterno-mastoid has only been implicated in one case. Turnbull notices that this implication of the sterno-mastoid is not probable when the inflammation is intense. Here we are more likely to have caries and post-aural opening. If the inflammation runs its course, it may cause suppuration, and the pus will find its way out either by the external meatus or through the mastoid process. Bearing in mind the anatomy of the bony parts, it must be a matter for surprise that the mastoid cells escape as frequently as they do when the tympanum is

affected. Still there can be little doubt that this spreading of the inflammation does frequently occur, and often is not suspected. Purulent or hyperplastic formation may take place in the mastoid cells, especially in children, and no external evidence exists of this occurrence. It is surprising how often in children, especially of the poorer classes, extensive bone changes may go on in the mastoid, leading to softening, necrosis, and caries, with but little indication of the danger, and consequently a degree of excusable neglect on the part of the parents. (See Aural Treatise.)

These cases I take from my treatise on aural surgery :—

In 1875 a child, aged four years, was brought to me with the following history :—Had been quite healthy up to a few months since, when pain in the ear and discharge began. Subsequently an abscess formed over the mastoid process. The child had two or three attacks of convulsions. On examining the ear I found the post-auricular surface soft and swollen, the meatus full of purulent and foul-smelling discharge. I cleansed this well out, and was surprised to find the meatus filled with a piece of loose and dead bone. This I removed, incised freely the mastoid process, kept the incision plugged with iodised wool, and cleansed with carbolic lotion daily, washing out the meatus with the same.

The child made a good recovery, but with loss of hearing.

In April 1877 a young lady consulted me. The right mastoid process was completely absent, a large hollow existing. This had occurred when she was a child, and was the result of mastoid abscess. Yet she had fair hearing power in the corresponding ear. Last year a child, aged eighteen months, was brought to the hospital with a large perforation of both mastoid processes and extensive inflammation. I freely incised the bone at either side, and almost the entire of the mastoid process came away at the time, being removed easily with the forceps. Some time afterwards she came, in my absence from home, and the other mastoid process had softened and now came away. The child became quite healthy. Here I syringed freely through the external meatus a disinfectant solution, such as chloride of zinc, Condyl's or carbolic acid, the fluid running out through the aperture in the mastoid. The parts have all now completely healed, and

the child was recently brought by the mother to consult me about the hearing, which is lost.

Early this year, a pale anæmic-looking child, aged twelve months, was brought to the hospital with ptosis in the right eyelid, dilated pupil in the same eye, and the vision apparently lost. There was a considerable swelling of the entire left aural region. The mastoid was very much inflamed, soft, red, and swollen; the auricle was projecting. Altogether the child had a most peculiar appearance. There issued from the meatus a foul and long-neglected discharge. The skin behind the auricle was perforated in two or three places, and the bone was evidently dead underneath. I determined to make a free incision into the mastoid, which I did, and though, at the time, there was very formidable venous hæmorrhage, this was pretty readily controlled with a plug and compress. The ear was daily washed out with chloride of zinc injection, and the mastoid dressed with carbolised wool saturated with chloride of zinc solution. Under this treatment the child did well, but the ptosis and strabismus remained. With the ophthalmoscope there was but little evidence of any abnormalities, the only thing apparent being a hyperæmic state of the papilla. Subsequently a large portion of the mastoid exfoliated (fig. 63), and this drawing was taken at the time.

OTHÆMATOMA OR SANGUINEOUS TUMOUR OF THE AURICLE.

FIGS. 59, 60, 61, 62.

Othæmatoma occurs, with very rare exceptions, only amongst those affected with cerebro-mental disturbance. It shows itself as a globular or ovoid tumour occupying the cavity of the auricle in whole or in part; in the latter case being bounded above by one of the ridges of the organ, disappearing below in the lobule; it forms rapidly, sometimes appearing almost suddenly without any increase of temperature, pain, or other signs of inflammation, and usually takes about three weeks before the tumour arrives at its maximum size; when fully developed the latter then begins

to shrink, and as it does so, from the adhesions to the skin and unequal contraction, throws the folds of the auricle into kinks and twists which sometimes assume the most *bizarre* forms, and often completely obliterate the normal appearance of the ear, this constituting the *secondary* stage of the affection. Othæmatoma was believed to be due to violence inflicted on the organ, but this view has now, for many obvious reasons, been discarded, and pathologists look upon the affection as connected with the cerebral disorder, and dependent probably on some intimate change in the cervical sympathetic nerves governing the vascular supply. The tumour consists in the *primary* stage of a cyst containing fluid blood, differing in no wise, either then or in the subsequent changes which take place, from blood extravasations occurring elsewhere. The contents of the sanguineous tumour gradually, by inspissation of the former, becomes solidified, and on section then presents a fleshy appearance. As the formation grows older, connective tissue and then cartilage becomes developed, and in some cases the latter may finally be transformed into bone. A section in the advanced *secondary* stage generally shows an admixture of connective tissue, cartilage, and islets of adipose cells. Othæmatoma occurs most frequently in cases where mental excitement runs high, as, for instance, in acute mania or melancholia, where the hyperæmia is excessive, in many of the forms of general paresis, and in epileptic insanity with paroxysmal excitement, the shrivelled ear is, however, often seen in chronic and hopeless demented, as the remnant of the acute stage of the mental derangement long since passed away. Though from a prognostic point of view othæmatoma is a most unfavourable complication in any case of insanity, yet recent experience shows that it cannot be looked upon as one of the physical signs which characterise a hopeless case. As regards treatment, painting the surface of the tumour with vesicating fluid has been attended in several recorded cases with success. Evacuation of the fluid contents, either by incision or aspiration, followed with compression of the cyst walls to prevent the subsequent unequal contraction and distortion of the auricle, has also been recommended, but in the large majority of cases the mental condition of the patient precludes the possibility of surgical measures being carried out with a reasonable prospect of success.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

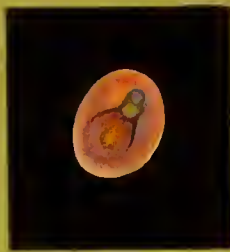


Fig. 5



Fig. 6

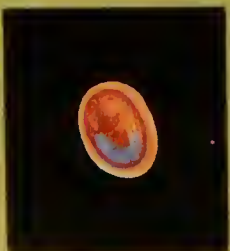


Fig. 7.



Fig. 8



Fig. 9.

P L A T E I.

FIG.

1. Exostosis in meatus; small chink existing. This patient (a medical man) was subject to recurrent furunculus in the meatus.
2. Other ear of same patient; exostosis; some purulent matter blocking up the chink.
3. Exostosis in meatus; membrane perforated.
4. Small growth from roof of meatus, osseous, vascular, with old altered membrane in a case of chronic catarrh which has lasted for years.
5. External meatus of patient, suffering from recurrent abscess, with thickening and chronic inflammation of auditory canal.
6. Normal membrane.
7. Severe inflammation of membrana tympani, 14 days' duration.
8. Partially inflamed membrane, in case of Eustachian deafness and post-nasal catarrh.
9. Membrana tympani absent, portion of malleus seen at lower margin of the remaining rim.



Fig 10



Fig 11



Fig 12



Fig 13

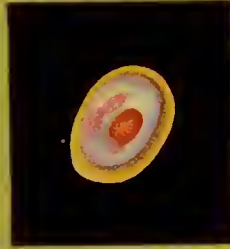


Fig 14



Fig 15



Fig 16

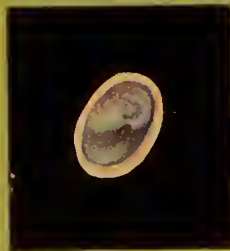


Fig 17



Fig 18

P L A T E I I .

FIG.

10. Almost complete absence of membrane.
11. Extensive perforation of membrane—result of scarlatina.
12. Complete perforation of membrane, portion of malleus remaining.
13. Complete perforation as in Fig. 12, after scarlatina.
14. Membrana tympani, perforated and inflamed, displacement of malleus, two years after scarlatina ; polypus removed from this case
15. Idiopathic perforation, no pain during occurrence, drawn when healing ; aperture ultimately completely closed.
16. Membrane after removal of pus and mucus, with epithelium, disclosing a large perforation in inferior segment ; origin of mischief, sea bathing.
17. Membrane altered in appearance, dull grey ; malleus displaced, and minute dry perforation in the centre of the membrane.
18. Membrane altered, malleus not seen, small pin-hole perforation. A polypus was removed from external meatus of this patient disclosing this membrane.



Fig 19.



Fig 20.



Fig 21.



Fig 22.



Fig 23.



Fig 24.



Fig 25.



Fig 26.



Fig 27.

PLATE III.

FIG.

19. Inflammation of the membrane, drawn after recent acute perforation.
20. Septum of membrane remaining, with portion of malleus seen. Poly-
pus removed.
21. Curious double perforation of membrane, malleus remaining.
22. Membrane with large central perforation, drawn when healing, and
after treatment by alcohol and glycerine applications.
23. Membrane in great part absent, sebaceous tumour in the cavity of the
tympanum.
24. Same ear after removal of the tumour, with the lever-ring forceps.
25. Curiously altered membrane, folded appearance, inflamed, drawn in,
malleus not seen. Ten years after scarlatina.
26. Old case of Eustachian closure, extreme deafness.
27. Concave membrane, adhesions, malleus displaced. Cause, Eustachian
closure.



Fig 28.



Fig 29.



Fig 30

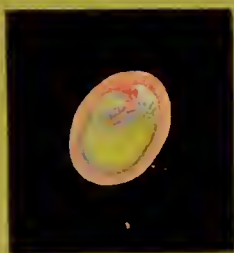


Fig 31



Fig 32



Fig 33.



Fig 34



Fig 35



Fig 36.

PLATE IV.

FIG.

28. Peculiar thin membrane, complete collapse, one large pocket, malleus completely displaced, membrane rather *transparent* than thickened, of a pinkish hue, Eustachian closure.
29. Membrane, drawn immediately after removal of impacted cerumen.
30. Membrane in thickened folds and displaced malleus.
31. Old Eustachian case. Membrane very white, one large pocket blown out bladder-like on inflation.
32. Mucus in cavity of tympanum, bulging behind membrane, aural vertigo. Tinnitus.
33. Peculiar appearances presented by a membrane covered with epithelium and oily deposit. On removal of a large scale of this amalgam, this membrane presented the appearance seen in fig. 34. Patient for some time dropping oil into the ear.
34. Same membrane seen inflamed and altered on removal of the coating above described.
35. Membrane drawn in, malleus displaced, thickened; case of enormous hypertrophy of corresponding tonsil, and Eustachian closure.
36. Membrane of patient suffering from acute inflammation; on examination, fulness and bulging of upper and outer segment with perforation.

PLATE 5.



Fig 37.



Fig 38



Fig 39



Fig 40.



Fig 41



Fig 42.



Fig 43.



Fig 44



Fig 45.

PLATE V.

FIG.

37. Membrane, drawn when inflamed ; history of old recurrent attack of inflammation.
38. Polypus growing from roof of meatus, immediately in front of membrane, which was found to be entirely absent on the removal of the polypus.
39. Same ear, showing deceptive appearance of this polypus before the ear was cleared out, and a large flake of epithelium removed.
40. Vascular polypus on membrane.
41. Membrane after removal of small polypus.
42. Perforation after scarlatina, polypoid mass protruding from cavity of tympanum.
43. Membrane, with perforation, from which a small polypus was recently removed.
44. Small polypus growing from roof of meatus, close to membrane, the latter altered, sodden and thickened.
45. Polypus (mulberry) in cavity of tympanum of insane patient, producing vertigo.



Fig 46.



Fig 47.



Fig 48.



Fig 49.



Fig 50.



Fig 51.



Fig 52.



Fig 53.



Fig 54.

PLATE VI.

FIG.

46. Mulberry mass, protruding in front of a perforation ; some pus seen above ; inflamed and fleshy membrane to the side.
47. Membrane, drawn after removal of polypus and healing of perforation.
48. Membrane, with crescentic cretaceous deposit, adhesions, &c.
49. Membrane, with cretaceous deposits at each side of malleus.
50. Membrane in case of extreme deafness, result of blow on the head, followed by hæmorrhage from the ear, rupture of tympanum.
51. Membrane of a patient suffering from severe aural vertigo and tinnitus.
52. Ear of a patient attacked with hereditary syphilis both in ears and eyes. Deafness and tinnitus.
53. Membrane, drawn with purulent matter covering its surface ; the portion so covered was perforated.
54. Membrane of child suffering from ottorrhœa ; on clearing out purulent matter, membrane disclosed as represented. This child subsequently died of brain mischief, having ceased attending the hospital.

PLATE 7



Fig. 55



Fig. 56.



Fig. 57.



Fig. 58.

PLATE VII.

FIG.

55. Abscess in external meatus.

56. Polypus protuding from meatus.

57. Auricle of patient suffering from eczema (variety described at page 18).

58. Auricle of patient who had suffered for years from recurrent attacks of same affection ; drawn after complete healing of the ear, showing the existing deformity.

PLATE 8.



Fig. 59.

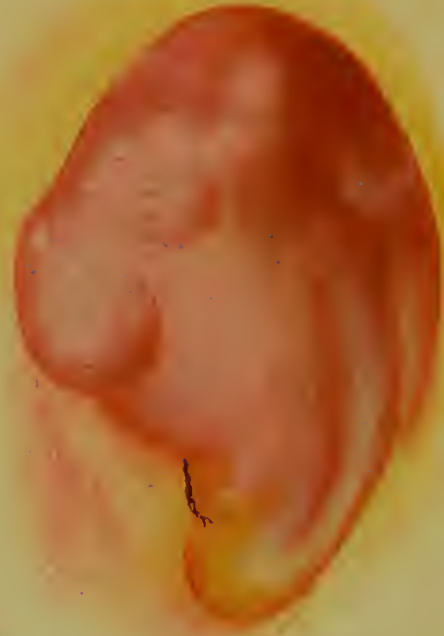


Fig. 60.



Fig. 63.

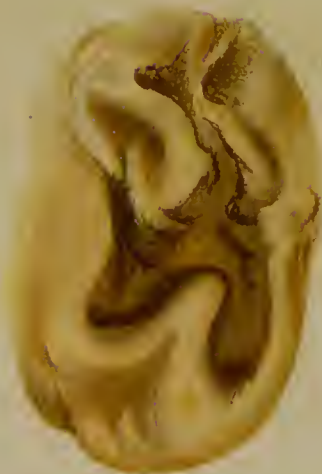


Fig. 61.

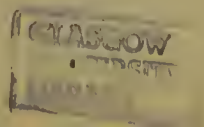


Fig. 62.

PLATE VIII.

FIG.

59. Othæmatoma in the acute or *primary* stage. Tumour of moderate size filling up the cavity of the concha; full and rounded above where it is bounded by the ridge of the antihelix, being lost below in the lobule. *Result*, disappearance with but little subsequent deformity. Case of C. H., affected with recurrent paroxysmal mania (taken from life).
60. Othæmatoma in the acute or *primary* stage. Tumour of extraordinary size occupying the entire cavity of the auricle, and obliterating its ridges and hollows. Surface uneven, and in parts of a plum colour. *Result*, slow absorption, with extreme contraction, and finally the almost complete distortion of the auricle, and obliteration of its several component parts. Case of E. H., affected with active melancholia (taken from life).
61. Othæmatoma in the *secondary* stage (stage of shrinking). Upper portion of auricle folded and twisted upon itself, so as to partially obliterate the fossa of the antihelix. Affection of long standing. Case of B. C., affected with epileptic idiocy (taken after death).
62. Othæmatoma in advanced *secondary* stage, helix folded over antihelix, fossa of latter completely obliterated, the upper portion of the auricle was transformed into an irregularly tuberculated misshapen mass; on section a triangular portion of bone had become developed in the centre, surrounded with cartilage and connective tissue. Affection of very long standing. Case of J. M., affected with chronic dementia (taken after death).
63. Necrosis resulting from Mastoid Periostitis (see page 27).



Medicine

SE 62

1878-J

